



FIG. 1--A Fireproof Cottage of New England Style. Residence of Mr. V. M. Hillyer. Washington, D. C.

THE MORRILL MOULDED CONCRETE HOUSES

Milton Dana Morrill
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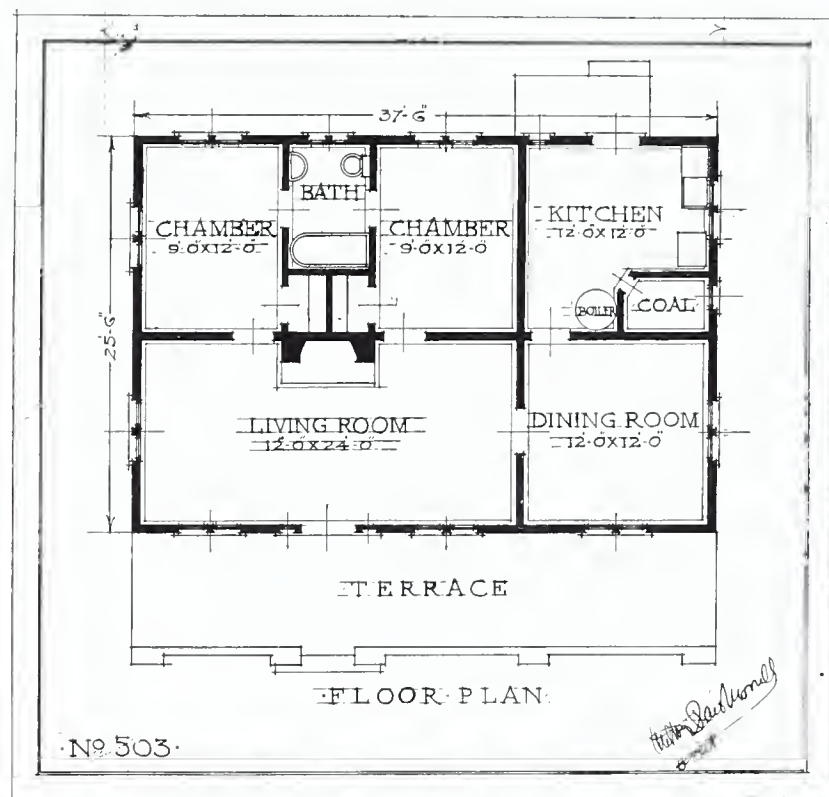


FIG. 2.

The Morrill Moulded Concrete Houses.

HOW THE WORK STARTED

Milton Dana Morrill, the architect for these houses, was born in the White Mountains of New Hampshire in the year 1877. He comes from one of the older New England families.

His Architectural training included extensive foreign travel and a post-graduate study in the Atelier of Monsieur M. Duquesne in Paris.

Mr. Morrill was for several years designer of government buildings in Washington, D. C. The new million dollar post-offices in Atlanta, Ga., and St. Louis, Mo., represent a part of his work.

In 1908, Mr. Morrill resigned from the Government service to take up what he had chosen to be his life work, the design and building of better houses.

LARGE IDEAS IN SMALL HOUSES

He felt that there was a need for expert service in the economic production of better houses and so left the work of designing large government buildings to take up the design and building of small houses.

Mr. Morrill selected reinforced concrete as the material in which to build because of its permanent, sanitary and fireproof qualities. The materials for making concrete can be found in most sections close at hand. When such is the case concrete has the advantage of being the least expensive as well as the most permanent construction for houses.

THE PRIZE HOUSE

Mr. Morrill's first design for a concrete house was the model house shown on pages 12 and 13. He was awarded the first gold medal by the International Congress on the Prevention of Tuberculosis in recognition of his work in designing a house which would be germ proof as well as proof against fire and decay.

OPPOSITION MET

As was to be expected, Mr. Morrill met difficulties and some opposition in this new work of

moulding concrete houses. The men who were accustomed to building in wood and brick predicted that these moulded concrete houses would be cold and damp much like a cellar. But the more progressive builders saw that reinforced concrete was the best construction for houses and would become the standard in house building just as it has become the standard for pavements, warehouses and engineering works. They knew that a construction which had been adopted as the best for great dams to keep water in, would also keep water out and so be best for house walls.

NEW METHOD OF BUILDING

In order to produce these concrete houses economically it was necessary to get away from the great waste of lumber and labor of the usual wood forms. Mr. Morrill accomplished this by inventing a system of steel forms which can be set up by unskilled workmen and used over and over again on house after house.

In this way not only have proper plans and structural details for the best concrete houses been worked out but also practical means of carrying out these plans have been developed. For several years Mr. Morrill used his steel moulds only on his own work. Later manufacturing arrangements were made which now places this new building method at the disposal of others to whom it can be of service.

As such equipment of steel moulds is good for use over again and again, a rental plan was worked out which is best suited where one or only a few houses are to be built in one location, or the moulds can be bought outright. The mould equipment for house building costs from \$100.00 to \$1,000.00 according to size, but as a hundred or more houses can be built with these same moulds the cost per house is almost nothing. As the plates are of pressed steel they are almost indestructible, so that they should be figured as equipment to be used on job after job.



FIG. 3—A Street of Moulded Concrete Houses.

THESE concrete houses, near West Chicago, Ill., were built by the E. A. Cummings Company in 1911 and sold on the installment plan. They have been tested by years of occupancy for the past eight years.

The clippings from the Company's letters will interest you:

July 5, 1912.

"Replying to your inquiry as to how our houses have stood the past winter, will say we have been unable to find one crack in the entire bunch of houses constructed by us last Fall; also, we had absolutely no trouble with dampness.

The people who occupied these houses were asked by us to let us know promptly if any dampness showed up and the houses were inspected by our Superintendent every week in addition. These people report that the houses were exceedingly dry and warm.

The seven-room bungalows heated by hot air furnace, required less than five tons of hard coal to heat from October 24th until the fire went out this Spring, during the coldest and most severe winter we have ever known in this climate."

March 29, 1916.

"We are in receipt of your letter of March 28th with reference to the poured concrete houses built by us at High Lake, Ill. May

we say these houses are standing well and giving good satisfaction.

"We have answered a number of inquiries relative to poured concrete houses from parties who knew we had used your methods and have been pleased to recommend them."

THE ARCHITECT'S OWN HOUSE

Another interesting instance is that of Mr. William Boring, Architect, of New York City, who selected reinforced concrete as the construction for his own house, because his investigation of other houses built and occupied in the vicinity showed concrete to be the best and at the same time the cheapest permanent and fireproof construction that he could use.

The following extract from Mr. Boring's letter shows that he not only has not been disappointed in his concrete house but that it has met his expectations. This letter was written to Mr. Morrill after he had occupied his house for two years.

"The work is standing up very well and I am much pleased with the construction.

I have frequently spoken in favor of your system of forms which seems to me for this class of work both practical and satisfactory."

Mr. Boring's house is shown on pages 12, Figure 34; Page 22, Figure 67.

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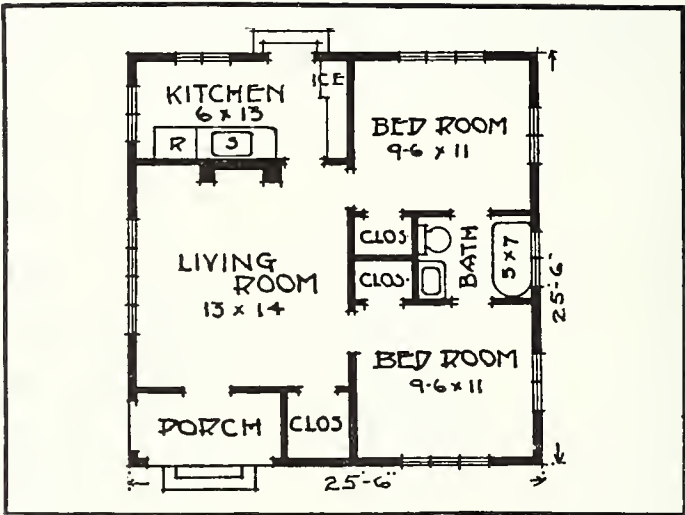


FIG. 4 and 5. One-story cottage of concrete, Milton Dana Morrill, *Architect*. A group of these small houses would make a striking and attractive colony, with concrete walls finished in white cement, and with a garden around each house.

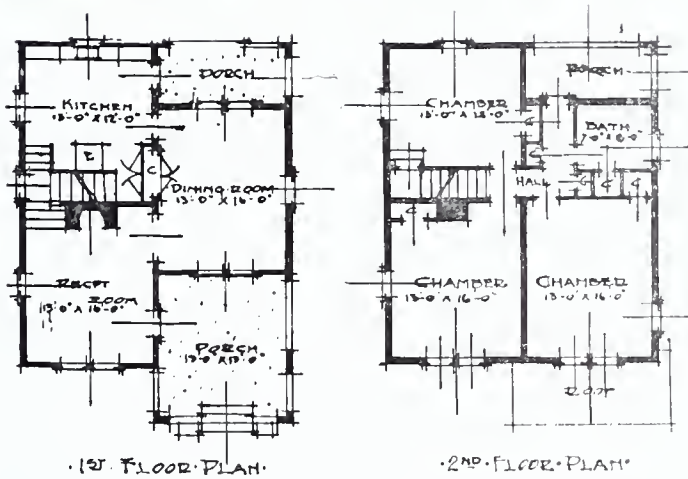
The One-Story House

THE one-story cottage is the most economical type, especially where the cellar is omitted and the roof made rather low pitched, so as to utilize a slag roof covering. In the low cost house we must realize that a cellar under the entire house adds materially to the expense.

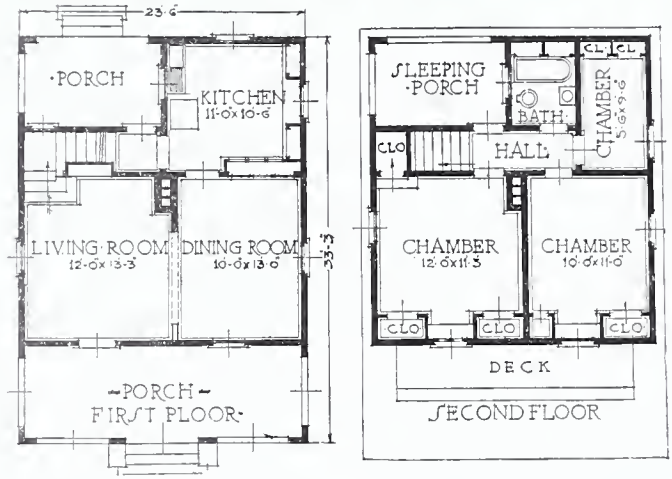
A colony of one-story cottages of this type could be made a very attractive as well as a very practical housing group. Where the cellars are omitted the drainage problem is much simplified, as sewers can be placed just below the frost line.

Cost of Four-Room Concrete Cottage

| | | | |
|---|---------|---|------------|
| Excavation | \$10.00 | Grounds \$10.00; paper over sub floors \$4.00.... | 14.00 |
| 500 lin. ft. $\frac{3}{8}$ " reinforcing steel $4\frac{1}{2}$ c lb. \$11.25. | | Coal box \$8.00; insurance and liability \$20.00.. | 28.00 |
| 900 sq. ft. 6" concrete walls 1:2:4 mix, Cement \$40. 0; stone \$15.00; sand \$7.50; Labor, mixing and placing \$34.00, setting forms \$36.00.. | 144.55 | Rental of steel forms, mixes, etc..... | 30.00 |
| 395 sq. ft. 10" foundation 1:2½:5 mix, Cement \$24.00; stone \$11.50; sand \$6.00; Labor, \$12.00, setting forms above grade \$4.00..... | 57.50 | 825 sq. ft. 2½" T&G flooring \$40.00; 2½c labor | 53.63 |
| 1020 sq. ft. one coat dash stucco..... | 20.00 | | \$1,399.47 |
| 1742 board ft. framing timber and labor..... | 104.52 | Add 20% to cover builder's profit and advanced prices | 279.89 |
| Bridging \$6.00; 1625 sq. ft. sub. floor and roofing sheathing \$31.00; labor \$10.00 per M..... | 72.62 | Total | \$1,679.36 |
| 120 lin. ft. exposed beam cornice 20c..... | 24.00 | The above estimate is based on Labor at \$2.50 per day, 8 hours; Carpentry Labor at \$4.00; Portland Cement, \$1.60 per bbl.; Stone, \$1.00 per cu. yd.; Sand, \$1.00 per cu. yd.; Reinforcing Steel $4\frac{1}{2}$ c per lb. | |
| 8 complete windows and 10 complete doors in place, \$10.00 each | 180.00 | It is assumed that the cottage is one of ten or more built at one time and at one place, so that building material can be bought at wholesale prices. | |
| 31 sq. yds. Furring 15c; 300 sq. yds. Plastering 50c | 154.65 | The above figure is based on first-class construction thruout and includes a building with a 6" reinforced wall lined with furring strips on the inside just as is customary in brick and stone houses. This construction affords a house that is warm in winter and cool in summer. The estimate includes double flooring with building paper between. | |
| 900 sq. ft. tar gravel roof, 5c per sq. ft..... | 45.00 | A cottage of this design should be located on a lot 40 to 60 ft. in width to give ample garden space. | |
| 400 lb. nails 5c | 20.00 | | |
| Staining wood work and painting sash..... | 50.00 | | |
| Plumbing \$250.00; electric wiring \$25.00..... | 275.00 | | |
| Quarter-round and base mould..... | 20.00 | | |
| Fireplace and chimney \$50.00; outside steps \$15.00 | 65.00 | | |
| Vents under floor \$6.00; vents in gable ends \$25.00 | 31.00 | | |



FIGS. 6 and 7—A six-room concrete house in the Craftsman style. The house is almost square in plan. It is compact and convenient. One chimney only. The porch is shown extended in plan. This makes an out-of-door living room screened in summer and enclosed in glass in winter. All the exterior woodwork is treated with creosote stain instead of paint. This saves in cost and gives a softer looking job.



FIGS. 8 and 9—A two-story cottage at Virginia Highlands, Va. The walls are white, the woodwork gray-green. The house has six rooms and bath. It is planned to save steps in house work. Note built-in dish closet between kitchen and dining room, opening both ways. The house, on a 50 x 100 ft. lot, was built and sold at \$2650.00. This was in 1911. At least 50 per cent. advance should be made in materials and labor.

Good Two-Story Houses

THESE two concrete houses are good examples of the better class of cottages. They are not only attractive in appearance, but are also comfortable, convenient and, of course, they are permanent and the cheapest in the long run and are of the kind that will solve the housing problem, especially from a renting standpoint.

European cities afford us an excellent example of permanency in the way of home building; the flimsy frame structure is almost unknown there, either as a home for the wage-earner or for hous-

ing the family of large income. It is not economic construction when wear and tear, fire risk and sanitation are to be considered. One needs only to review the annual fire loss in lives and property to prove our short-sightedness in building frame houses.

The core-block insulated walls (see page 21) enclose your house with a blanket of dead air spaces. The cold cannot get in. The warmest house in Winter and the coolest in Summer. These walls are wind and weather proof.

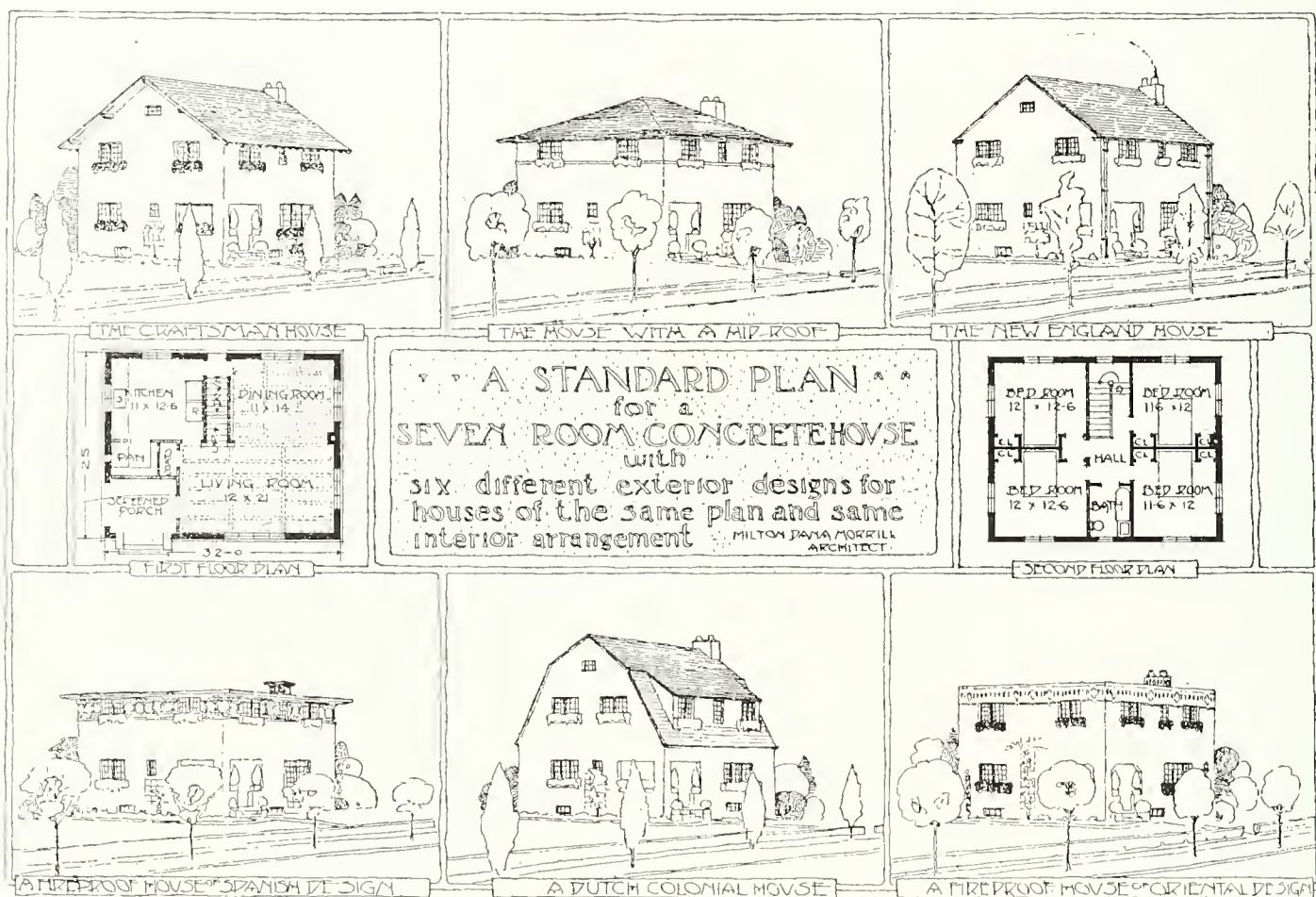


FIG. 10—Six different exterior designs of a seven-room house, each having the same plan and interior arrangement. This combines variety and economy.

The Morrill Standard Plan Houses

BY standardizing, house building can be made economical, and this same principle holds whether we apply it to the dwellings of the unskilled workman or to the houses occupied by those higher up in the wage scale.

The above standard plan for a seven room house has been prepared to show the possibilities which concrete offers for the building of suburban houses.

The reader will note that six exterior designs have been shown, all of which can be used with the same standard plan and interior arrangement. This gives a choice as to the exterior appearance. An entire block might be built up with these standard houses, and on account of the different exteriors and possible changes in color of the cement stucco, no two of the houses would be exactly alike.

Estimates on the construction of these concrete houses range from \$4000 to \$5000, according to

location and the cost of materials. This figure is based on a complete well-finished house.

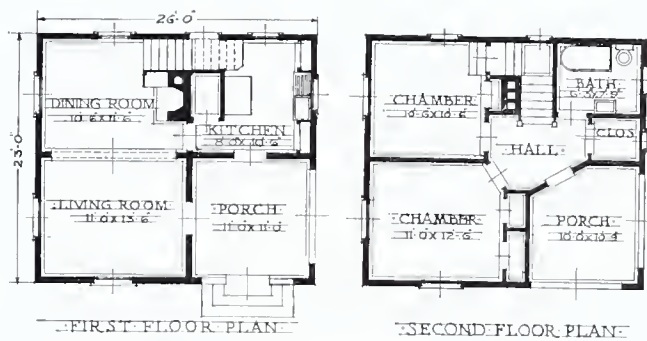
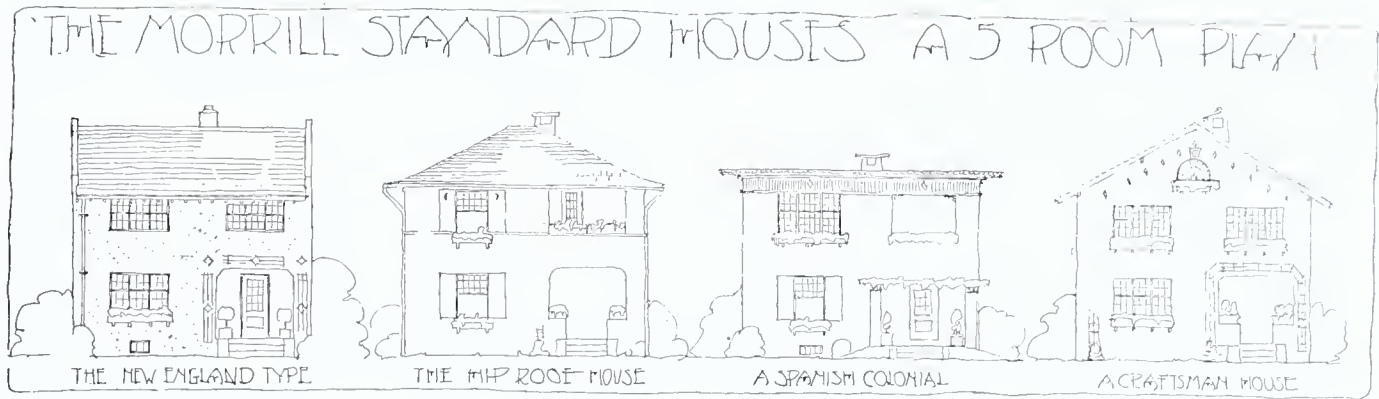
Modern manufacturing methods have been applied to house building. The principle which Mr. Henry Ford has so successfully applied to the production of automobiles has been worked out for the home-builder by the Morrill Standard Plan Houses.

HOW IT IS DONE

The concrete work is reduced to largely a machine operation. All of the interior woodwork, stairs, etc., is made up complete at a factory and shipped knocked-down to the job only to be set in place.

This does away with the lost motion on the usual house building job and makes it possible to have the work done on a piece basis instead of "by the hour." In this way it is possible to produce permanent fireproof houses almost at the cost of the usual flimsy frame structures.

Wholesale manufacture permits you to buy at an exceptionally low price everything needed to



Figs. 11 and 12—Four different exteriors for the same standard plan six-room house.

build one or one hundred of these houses. You save also in the cost of your plans.

We have been able to give here only a few of our numerous house plans. These are given as examples only, any changes which you wish can be made or new plans can be prepared for you according to your own ideas. The cost of making a preliminary plan is only a few dollars and the making of such a preliminary plan does not place you under any further obligation.

FOUR DIFFERENT DESIGNS FOR THE SAME STANDARD PLAN

THE ENGLISH COTTAGE

A WASHINGTON COTTAGE

THE SPANISH GABLES

THE DUTCH COLONIAL

THE HIP-ROOFED COTTAGE

THE MORRILL STANDARD PLAN GIVES YOU A PERMANENT HOUSE AT THE SAME COST AS FRAME

PLAN FIRST FLOOR

THE MORRILL STANDARD HOUSES OF MOULDED CONCRETE

FIG. 13—The Morrill standard plan houses are designed to give the best and most permanent construction at moderate cost. Our aim is 100% efficiency in house plans as well as in building methods.



FIG. 14—Part of a group of 40 concrete houses, built at Nanticoke, Pa., by the Delaware, Lackawanna & Western Railroad. Milton Dana Morrill, *Architect*.

Industrial Houses

The Concrete City, Nanticoke, Pa.

Delaware, Lackawanna and Western Railroad Company

THIS industrial settlement is made up of forty dwellings, all built of reinforced concrete. Walls, floors, partitions and stairs are concrete, the only wood work being the windows and doors.

The roof slabs are of reinforced concrete covered with a slag roofing which is the most permanent as well as the least expensive type of roof for the concrete house. Strips are nailed to the under side of the roof slab and a lath and plaster ceiling applied.

These houses have been occupied for several years. The monthly rental is now \$10.00 for a six-room house. The older residents of the group still get their houses for \$8.00, which was the established rental of four years ago.

All of the houses are of cinder concrete. The Morrill steel forms were used throughout the building operation, the marks of these forms show plainly inside and outside the houses as no plaster or other finish has been applied, the concrete being painted only.

From a structural standpoint the houses seem to be standing well, with no repairs except a coat of paint since they were completed. The permanency of this construction for industrial houses is here clearly demonstrated.

As stucco was not used these houses will require an occasional coat of paint, and the doors and windows might after many years have to be replaced, but otherwise there seems to be no reason why these houses should not be as good in 50 or even 100 years as they are today.

These houses were designed and built to accommodate the families of the average mine la-

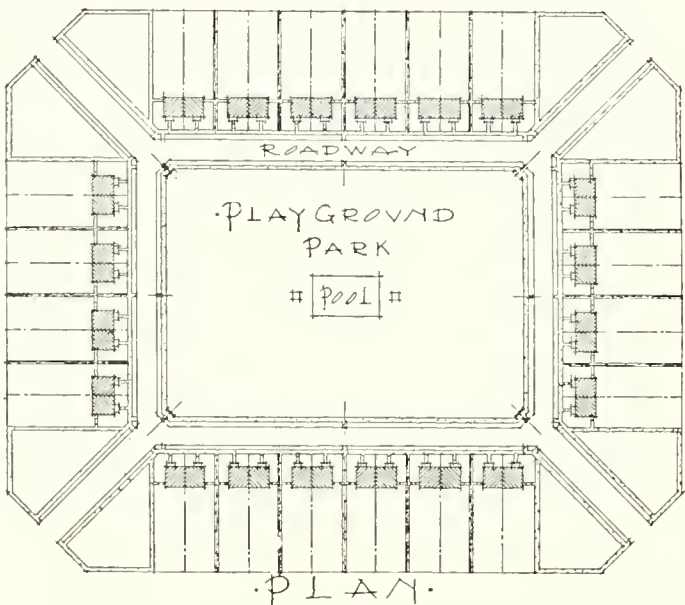


FIG. 15—Group plan of the 40 D. L. & W. R. R. houses located around an open square.



FIG. 16—Interior of one of the houses.

borer, whereas from the inquiry made they are occupied to a large extent by the families of the mine foremen.

No effort was made to conceal or remove the marks of the forms, in fact, these form marks were left purposely. They divide the walls and ceilings up into panels which are 24 inches square. The appearance of these form marks is somewhat rough.

The appearance of the house would have been improved had the exterior been treated with a coat of stucco, and on the interior if the mould marks had been rubbed off while the wall was green, more shrubbery and planting would also help.

In plan and design these new type dwellings have been standardized so that not an inch of space has been wasted and the rooms have been so arranged as to save many steps for the housewife. All the ordinary wooden trim such as that around doors and windows as well as along the floor, has been left out, and instead of corners to catch dirt and dust curves have been used. "They are so easy to keep clean," the visitor is told. Such dwellings are sanitary and germ-proof to a degree, as the whole apartment can be literally scrubbed and flushed out with a hose between rentals.

As there is nothing about these houses except the window sash and doors which could burn, the insurance is saved and as up-keep and repair is almost nothing, the Company is able to rent these forty model dwellings of six rooms each to its



FIG. 17—Vines, trees and shrubbery add attractiveness.

employees at this low rental, and still get a reasonable interest on the capital invested. Such buildings stand for real economy as they are practically everlasting. Moulded concrete becomes harder and stronger with age, so that such houses improve instead of starting to decay.

These houses cost, in 1912, \$1600 each or \$3200 for the double house. At the present time, the cost would be approximately \$3000 each or \$6000 for a double house.

The floor plans are similar to those shown in Figure 12, Page 7.

These houses were built before the time when all the modern conveniences were thought to be essential for industrial houses but the orderly appearance, the simplicity of design and the clean white walls makes this group stand out in striking contrast with the dilapidated frame houses such as are usual for "company houses" in the mining sections.



FIG. 18—Construction view, showing concrete being poured. Wholesale building by machine methods.



FIG. 19—A few of the 75 moulded concrete houses at Overlook Colony, for General Chemical Company.



FIG. 20—The two gables are spaced so as to break the roof lines of the row.



FIG. 21—The five end houses of the row.

HOUSES MADE OF ASHES

It is not unusual in our wooden cities to read of houses being turned to ashes but the building of 75 permanent houses out of ashes is more remarkable.

These cinder concrete houses were built for the General Chemical Company to house its war-time workers at Claymont, Delaware. As it was a rush job wood forms were used for a part of these houses but the waste in lumber and labor proved excessive. In the houses put up with the Morrill Steel Moulds (see Figure 54, Page 19) there was a saving of all of the lumber as none was used and the labor to set the steel moulds was only one half as much as it was to build the wood forms. Quite naturally the concrete turned out in the steel moulds was

smoother and better than that made in the wooden forms.

These houses show the great possibilities in the use of cinder concrete, using a waste product to build houses. Naturally a cinder concrete wall is not as strong as a concrete made of stone, but the cinder concrete wall with its network of steel reinforcing has ample strength for light work such as for house building and is much stronger and more substantial than the usual brick or tile walls.

The cinders from our steam plants in our cities might be used to advantage for building houses. The 40 fireproof houses at Nanticoke, Pa., shown on page 8 were also made entirely of cinder concrete.

Mr. Errol Coffin was Architect of the Overlook group. Mr. Morrill was in charge of the details of construction and of building the concrete houses.

THE MORRILL STANDARD PLAN HOUSES

The (L) shaped "AIR-LIGHT" houses show an extremely economical plan for group houses. These are in reality two family dwellings. As the plumbing fixtures are back to back, one set of drain pipes serves both houses. The roof is drained from one central point. One party wall does for two houses. All parts of the house are well lighted as it is only two rooms deep.

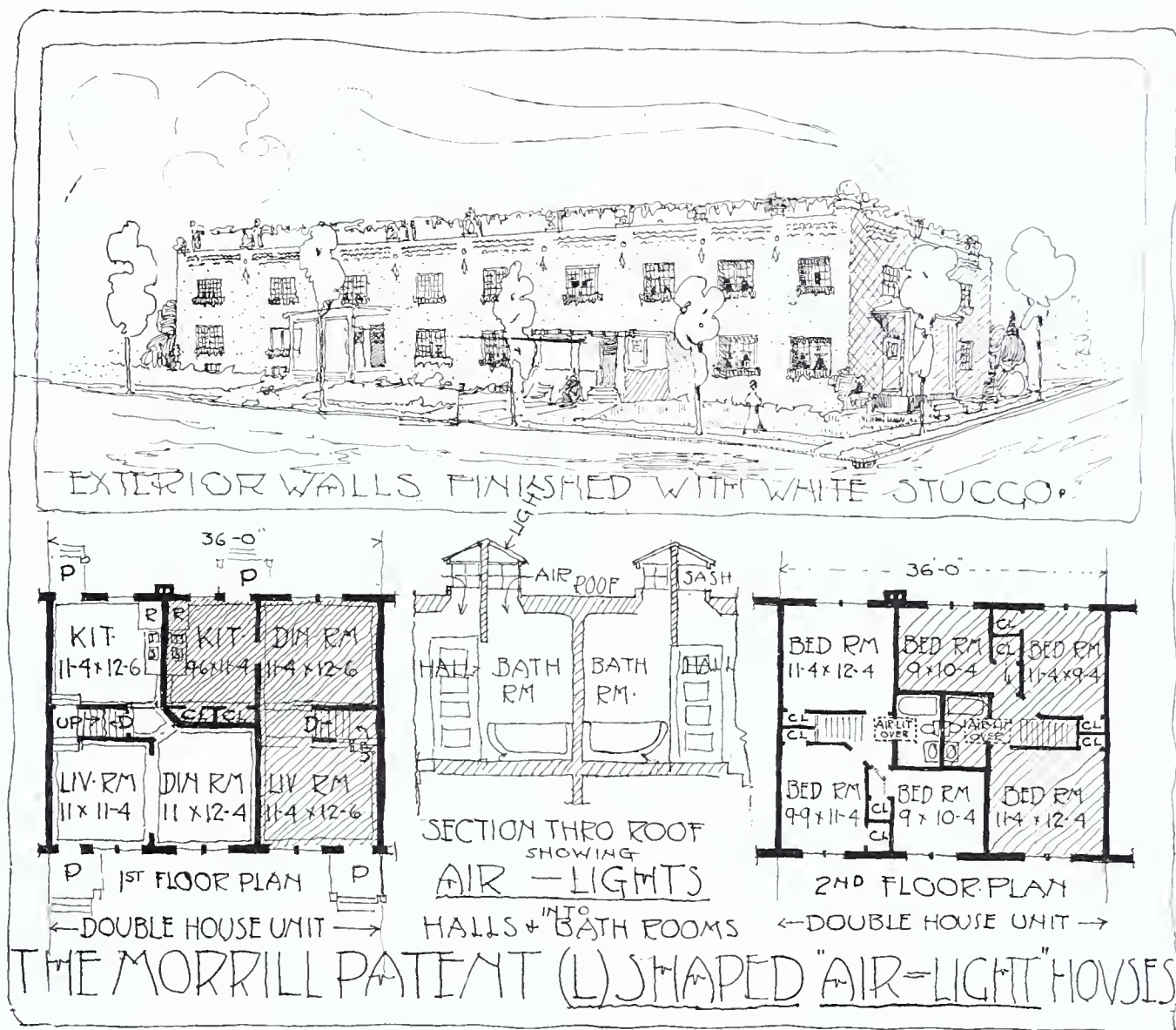


FIG. 22.

This not only makes a saving in the cost of construction but also saves in the cost of heating. This (L) shaped plan permits the building of two comfortable convenient houses on a lot that is only 36 feet in width. The efficient plan for low cost houses cuts out waste space, such as for halls, passageways, cellar and roof space. You will note that in this particular plan the percentage of waste space is exceedingly small. The flat or terrace roof is not only the least expensive in first cost but also the most permanent type and therefore the least expensive in upkeep. If desired this type of roof can serve as a place to live and sleep in the open air, or as a place for clothes drying.

From a construction standpoint these houses have several advantages.

1st. The trench for the cellars can be excavated to advantage by steam shovel. The mix-

ing and hoisting of the concrete can be done from central points.

The AIR-LIGHT feature which does away with the dark hall, affords perfect over-head ventilation to both the hall and bath room. This air-light feature is not particularly new as it has been in successful use in many Philadelphia houses for some years. Even with the present high cost of building it is estimated that these (L) SHAPED-AIR-LIGHT houses can be completed at a cost of \$2,000 to \$3,000.

While Mr. Morrill's ideas in house building are covered by several patents in the United States, Canada and in most foreign countries, these ideas can be used under liberal terms. The aim being to be of service rather than to charge high prices.



Fig. 23.

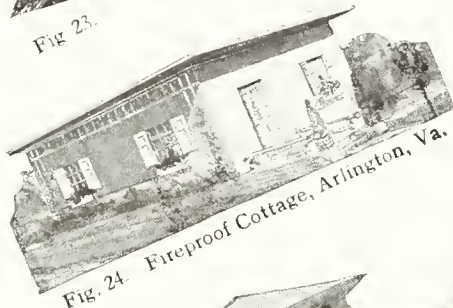


Fig. 24. Fireproof Cottage, Arlington, Va.



Fig. 25. Moulded Houses at Virginia Highlands, Va.

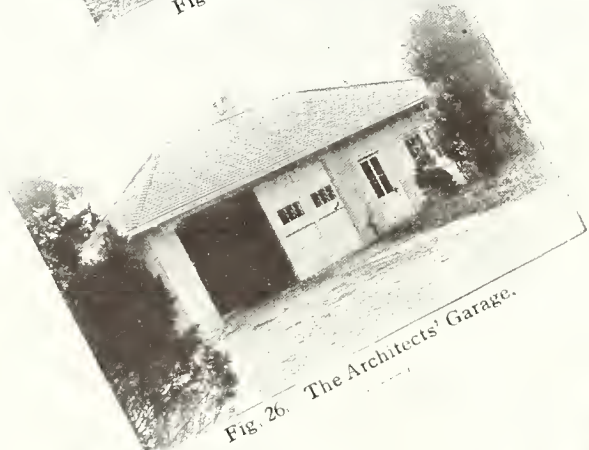


Fig. 26. The Architects' Garage.



Fig. 27.

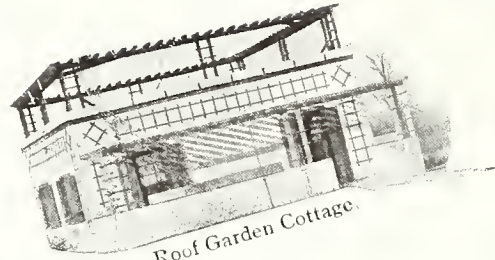


Fig. 28. Roof Garden Cottage.



Fig. 29.



Fig. 30.



Fig. 31. Standard Plan House

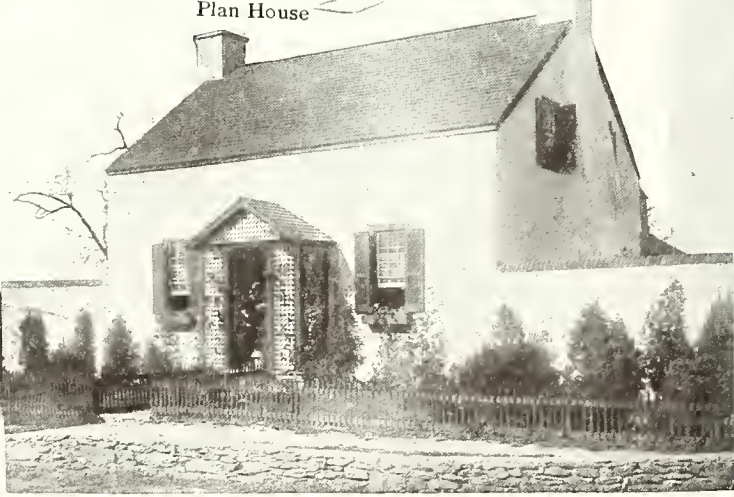


Fig. 32. Estate Cottages Julius Sterner, Archt., Huntland, Va.

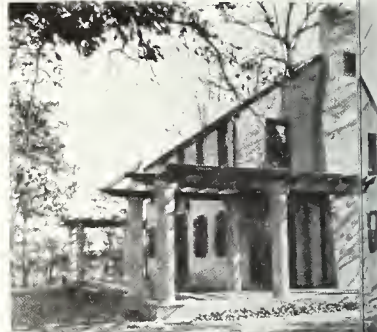


Fig. 33. Residence, G. Gordon Middleburg, Va.



Fig. 34. Architect's Own House, New Canaan, Conn.



Fig. 35. The Gold Medal House

The International Exhibition
Washington United States
September 2nd to October 1st 1904

This Certifies that a Gold Medal has been awarded to
Dana Morrill of Washington for the excellent
house for a family of the working class and
of the crusade against tuberculosis

Anna Elsworth Brown
Lawrence F. Rich
Charles G. H. H. H.
George H. H. H.

Fig. 36.

A FEW OF THE MORRILL



Fig. 37. Estate Buildings
Middleburg, Va.



Fig. 38. Engine House, "Huntland" Va.



Fig. 39. Residence, George Washington Lewis, Esq.
Braddock, Va.



Fig. 40. A Gardener's Cottage, Huntland, Va.



Fig. 41. Hunting Stable, Middleburg, Va.

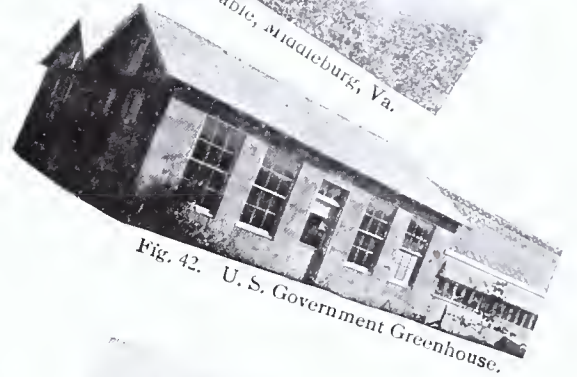


Fig. 42. U. S. Government Greenhouse.



Fig. 43. U. S. Government Work Shop.



Fig. 44. U. S. Government Warehouse, Arlington, Va.

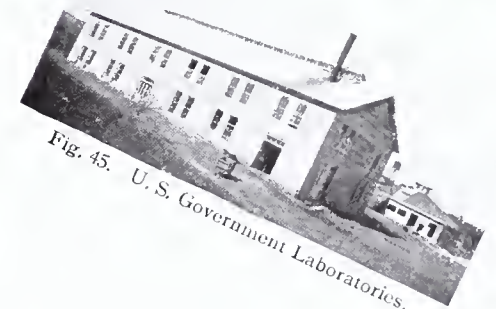


Fig. 45. U. S. Government Laboratories.

THE KINDS OF HOUSES

The Morrill Moulded Houses may be built with only the exterior walls of concrete. The interior can be like any other kind of a house.

FIREPROOF FLOORS

We can go one step further and make the floors of wood laid over a concrete slab, thus eliminating the point of greatest risk. The interior walls may be finished for paint, wall paper or veneer wood paneling.

THE ALL CONCRETE HOUSE

We can, if desired, go a step further still and make the whole structure of reinforced concrete, giving the cement floors a stain and polish so that the appearance will be like that of brown Spanish leather.

This makes a house that is entirely fireproof and is perfection from a sanitary standpoint. The interior of such a house is much like the surface of a china dish. It can be washed out from top to bottom. All the corners can be made curved and all of the usual dust-catching woodwork at the windows and doors can be omitted.

All interior plastering may be omitted if desired, the inside face of the insulated core-wall being rubbed down to a sand finish soon after the work is completed. This sand-finished wall can be afterwards finished by spraying with water paint or brush coats of oil paint.

An interior of this sort will be very simple and plain, but if the walls are given a stipple finish and rugs are used as floor covering such an interior can be made very attractive.

WALL INSULATION

In our colder climates these concrete walls are all lined to form an air space on the inside just as is the custom with brick or stone houses or what is better, these walls can be moulded with insulating core-blocks bedded in the concrete. See Fig. 58, Page 21.

This makes a wall that keeps the cold out of the house as well as holding the heat within. It is more effective and at the same time a stronger construction than the ordinary hollow or air spaced wall.

SIX DIE AS HOME BURNS.

Hurteau, Half Strangled with Smoke, Saves Two Children.

MALONE, N. Y., July 19.—Six persons were burned to death in a fire that destroyed the home of Lee Hurteau, at Massena, early today. The dead are: Mrs. Lee Hurteau and two children, Hextorine, aged 15, and Earl, 3; Mrs. Ernest Amell of Cornwall, Ont., a sister of Mr. Hurteau, and her two children, Deonel, 9 years, and Harold, 7.

Awakened by the screams of his wife, Hurteau made his way to a window, through which he crawled to the front porch, calling to his wife to collect the family by the window. Although nearly suffocated by smoke he managed to reach the ground and get a ladder, which he placed against the window. After rescuing two of his children he was overcome by smoke and lost consciousness. When he revived he again mounted the ladder, but there was no one near the window and it was impossible to enter the room. He tried the other windows in an effort to locate his and his sister's families, but by this time the fire was raging throughout the building.

Firemen subdued the flames and found the bodies of the victims, all terribly burned.

EDUCATE FREED PEONS.

Your family housed in a Morrill Built unburnable home
will be safe from such a calamity.

Fire-trap, frame houses are dangerous. If we realized what they cost alone in high taxes for fire protection and in higher insurance such construction would be rightly barred from urban communities just as is the case in European cities.

People do not realize the appalling toll in lives and property which the demon, fire, takes from our American homes each year.

For the lowest cost houses economy may still be a lame excuse for using wood for the interior construction but for the house, costing ten thousand or more the difference is so slight that there is today no valid excuse for building, in wood beamed burnable construction.

Surface Finishes

CONCRETE when placed in a form will take the exact shape of the mould. Every defect on the forms will show on the wall as well as every different mix of concrete.

Experience would seem to indicate that a thin cover coat of White Cement stucco is the best as well as the cheapest finish to give moulded concrete walls. This bonds perfectly with the rough moulded concrete and makes a permanent and attractive finish. It also gives a waterproof surface, which helps to keep all dampness out of the wall. The cost of this dash coat is from 20 to 30c per square yard, material and labor.

The reinforced concrete walls make not only a very substantial and warm house in winter, but present a very attractive appearance with the cement stucco finish which is generally used. This stucco finish can be made of white or gray cement and tinted if desired. Vines and flower boxes show to advantage when used to decorate against these stucco walls. These stucco finish walls are permanent—they save a lot in paint and repair. These stucco walls become more beautiful with age.

ONE-PIECE HOUSES

The Morrill Moulded houses are of monolithic concrete moulded in place and reinforced by a network of steel rods bedded in the concrete as the work is done. These rough moulded walls are then finished with a dash coat of white cement stucco. This can have a pebble-dash, a rough or smooth surface as desired. This surface requires no painting upkeep or repair and has a lasting bond to the rough moulded walls.



FIG. 46—To the right of the above picture is a section of the rough moulded walls, with the pipe holes filled in. To the left is a section of the finished walls. Note how thin the finish coat of the white cement stucco is made.



FIG. 47—Texture Finish—White Stucco

The Morrill Patented Steel Moulds

For Concrete Building



FIG. 48—Moulds set up to make the entire walls of a house in one day. The finished house is shown, Fig. 23.

THE standard unit is a plate 24 inches square. It is punched from the sheet flanged by pressing through a die. These plates are secured together, flange to flange, by using "U" clips and steel wedges.

Another size is an oblong plate 16 in. x 48 in.

Spacers and Wedges secure the two faces of the form rigidly in place. To avoid the use of special dimension plates to fit different size buildings, the corner plates lap by, thus obtaining any dimensions desired. (See Fig. 50).

The Morrill Moulds may be used in four different ways according to the work to be done.

1. The plates may be set up story high and poured at one operation.
2. The two-tier "swing-up" method may be employed.
3. The one-tier move forward method may be used.
4. For the small job, the two-mould swing forward outfit is most suitable.

The first method (shown in Fig. 48) allows the pouring of an entire story of a house in one day.

The second uses a smaller equipment, and the walls for the average 2-story cottage take one week.

The third—the one-tier move-forward outfit—requires only a few pairs of plates, and as each outfit is very moderate in cost, it is possible on a development to have from 10 to 20 houses going on at the same time. With 20 of these small outfits it is possible to complete 3 to 5 houses per day after the work is started.



FIG. 49—"Swinging up the plates" (the two-tier method). U. S. Government operation Department of Agriculture. Colored farm hands are doing the work.

THE TWO-TIER SWING-UP METHOD (See Fig. 49)

The upper and lower tiers of plates both inside and out are secured together in multiples of 10 to 15. These two tiers of plates are connected from their center points by hinge arms. See Fig. 50, part 5.

The two tiers of plates are set up on the foundation and filled with concrete and allowed to set a few hours. The lower tier is released by driving out locking wedges. This allows the plates to hang free as is shown to the left of Fig. 49. The contact face of the tier can be cleaned and the tier of plates is ready to be swung up in place for the next course of concrete. This swing-up method of handling the plates is shown to the right in Fig. 49. In this way from 40 to 60 square feet of wall forming is set in one operation, and the plates are swung up tier after tier until the top of the wall is reached. Then the connecting wedges are driven out and the plates are ready to move to the next job.

LABOR COSTS SAVED

The labor cost of stripping, cleaning and setting the moulds varies somewhat. With inexperienced men 2 cents per square foot is perhaps the average cost. With practice, even unskilled workmen learn to set and swing up the steel forms rapidly. One-half cent per sq. ft. is an average labor cost after the crew becomes accustomed to this work.

THE SWING UP SAVES

The two-tier SWING-UP method of setting forms is the least expensive and at the same time the most rapid method of wall building which we have today. There is no waiting for the forms to be completed. There is no waiting for the concrete to set as is the case where an entire story is set up and poured at one operation. In the two-tier SWING-UP method of building it will cost a little more to place the concrete as it is a continuous process.

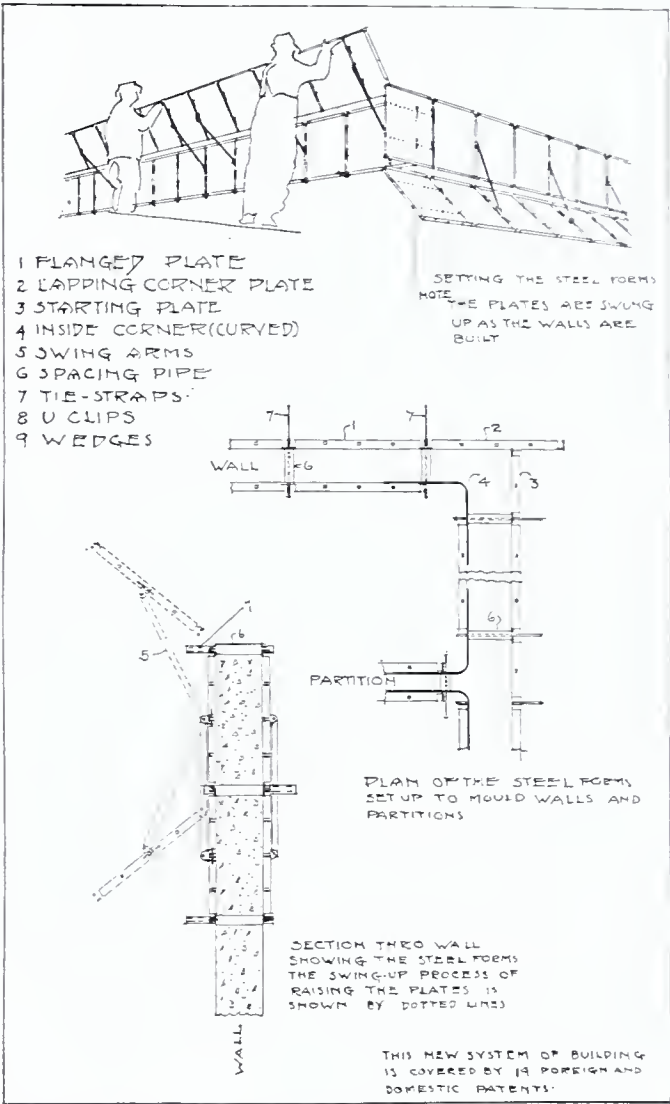


FIG. 50—Detail showing the Morrill Patented Moulds and their operation.

As the plates lap by when turning corners, the outfit is adjustable to any dimensions of the building. See Fig. 50, part 2.

FOR RAPID BUILDING

After the footings are in place the forms can be set up and from 4 to 6 feet of concrete wall can be completed on the first day and at least 4 feet each day thereafter.

In moulding walls by two-foot lifts the pressure against the forms and frames is moderate. The work can be constantly under inspection. Frames and reinforcing can be easily and accurately set in place as the walls rise. The concrete at the bottom has a chance to set up before the weight of the wall comes upon it.

By the two-tier SWING-UP method the forms are removed from the face of the concrete before it is too hard, thus it is possible

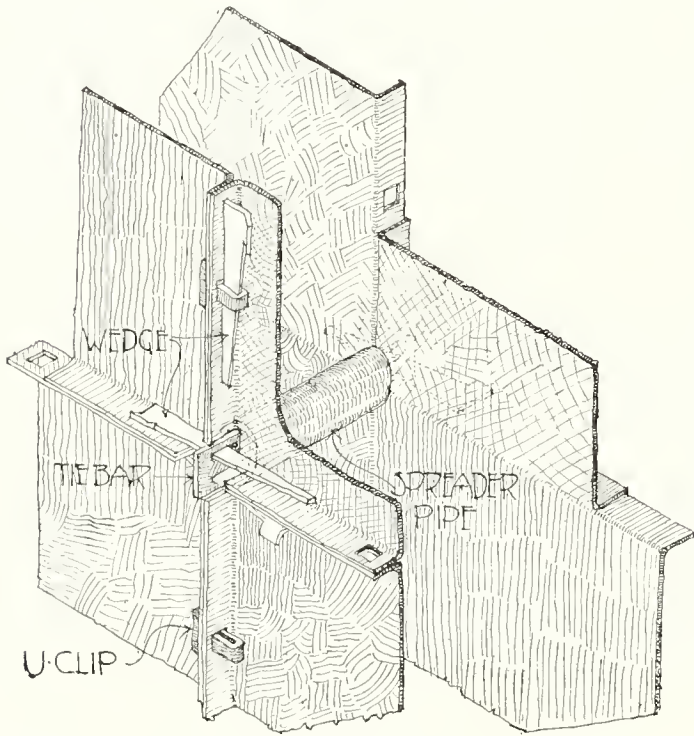
to rub the exposed surface and remove the form marks with ease.

By the SWING-UP method at one operation three men can raise and set in place 50 square feet of forming in less than three minutes time.

In the SWING-UP most of the weight of the forms is thrown on the wall; it is not a dead weight to lift.

In the SWING-UP the forms are raised up the wall in a hand over hand motion. There are no loose plates to fall.

The spreader pipes are easily driven out by the use of a tool made for the purpose. This should be done as soon as the forms are removed. On thick walls and elsewhere if desired concrete spreader blocks can be substituted for the pipe spreaders, in which case the concrete spreader is left in place. If desired wire ties may be used to hold the steel forms in place.



THE SIMPLE WEDGE CONNECTIONS HOLD THE PLATES RIGIDLY IN PLACE. EASY TO SET UP- EASY TO TAKE DOWN

FIG. 51—Shows the simple rigid connections of the Morrill Moulds. On the walls of 12 in. or less in thickness 1¼ in. pipe spreaders are generally used. The punched tie bar passes thru this spreader pipe and at one joint the corners of eight flanged plates are clamped to absolute position and alignment.

These pipe spreaders not only serve to make the most rigid and exact form connection, but the pipe holes through the walls are otherwise useful.

Five-foot lengths of 1¼-in. steel tubing are run through these holes. Light planks are laid on these pipes, thus forming an excellent scaffolding, which is moved up as the wall rises. After the cornice work is complete the scaffold is moved down stage by stage. The pipe holes are filled in and the one coat stucco over-coat applied. See Fig. 60—pipe scaffold in use.

In pouring the walls by the SWING-UP two-foot lifts there appears to be less shrinkage and less checks and cracks than where the whole height of the story is poured at one operation.

For the above reasons many builders prefer to put up their walls by the two-tier SWING-UP method even when they have at hand forms enough to complete the whole job at one operation.

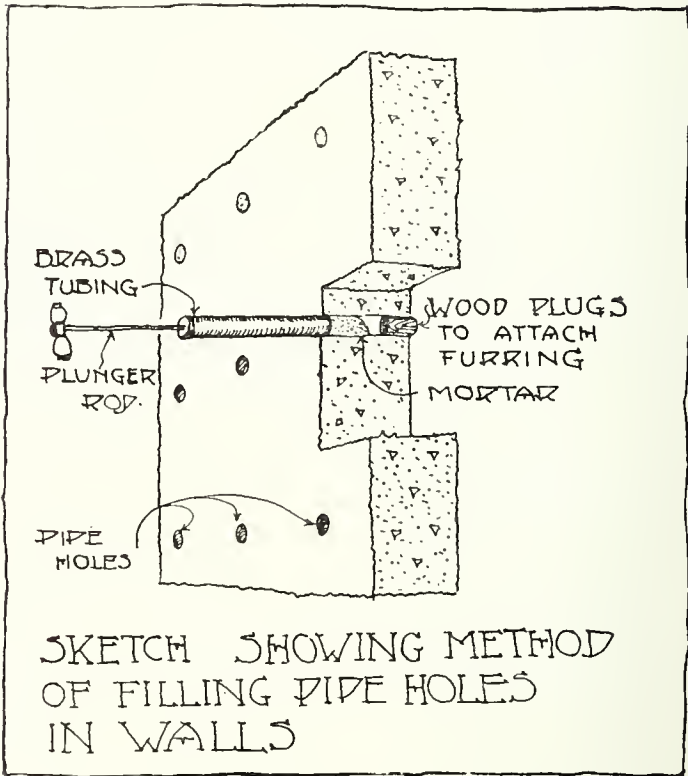


FIG. 52—The filling of the pipe holes in the walls is easily done as is shown by the use of a brass tube and a plunger. The tube is filled with mortar from a pail and mortar is forced into the pipe holes somewhat as the grease gun on the automobile does its work.

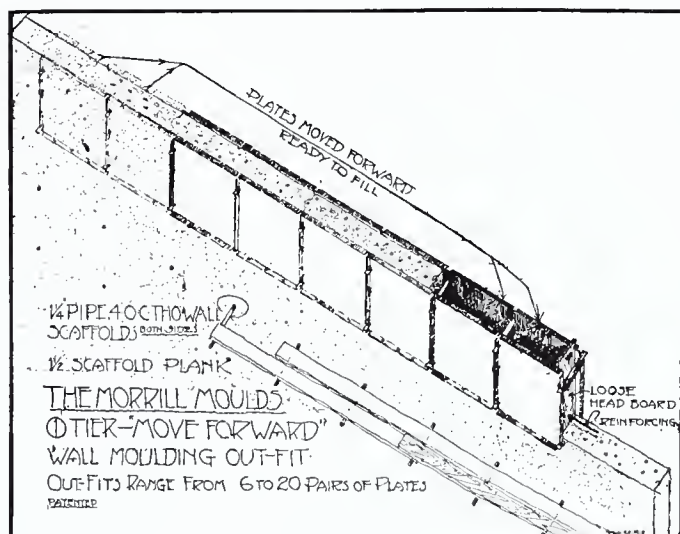


FIG. 53—The One-Tier Move Forward Outfit.

Mr. Morrill in his work of moulding concrete walls in place, has developed the simple outfit and method shown in Fig. 53. A few pairs of flanged steel plates are set up where the wall is to be moulded. The concrete is mixed about the consistence of oatmeal—not too wet—a “quaking mix”—as it is called on the board.

The moulds are then filled, starting at one end. Each batch fills 2 or 3 moulds. When the last moulds have been filled, it will be found that the concrete in the first moulds filled has so stiffened that by using slight care, the steel plates can be removed from the sides having the block of fresh concrete standing in place. These plates are then free to be moved forward and set up again ready to be again filled. This becomes then a progressive and continuous process. The Back plates are removed 2 or 3 pairs at a time and set forward.

It has been found possible under favorable conditions to raise the wall around the house 4 feet each day. The size of these wall moulding outfits runs from 10 to 50 moulds or pairs of plates. The larger the equipment the faster the forms can be moved, as the more time is given for the concrete in the forms to stiffen.

The advantages of this wall moulding method are as follows:

The removal of the forms as soon as the concrete will stand by itself permits the work

to be finished by floating, rubbing or by a wire brush while the concrete is green. Form marks can be removed. If cement stucco is desired the surface can be scratched so as to give perfect bond for the stucco.

On account of the progressive feature, it is easy to keep and carry this wall straight, plumb and level, as each time the plates are moved forward the line and level is given by the plates then filled and in place, and by the wall below as the empty plates lap down a few inches over the wall already in place.

This simple operation of wall moulding is rapid, as each time a section of 2 pairs of plates is moved forward and set, a block of 8 square feet of concrete wall is completed.

The building operation is continuous. With a small concrete mixer a crew of only 4 to 5 men is needed.

The cost of this outfit is very moderate considering that all parts are of pressed steel and almost indestructible when given reasonable care. The complete cost of the plates, corners, connections, etc., is \$10.00 per two-plate-mould-section. A 10-plate outfit costs \$100.00.

As each outfit is moderate in cost, it is possible on development to have the walls of 10 or 20 houses going up at one time.

Being light, inexpensive and easily shipped this wall moulding outfit is well adapted for the small job, such as a house foundation, as well as for building work around the farm.

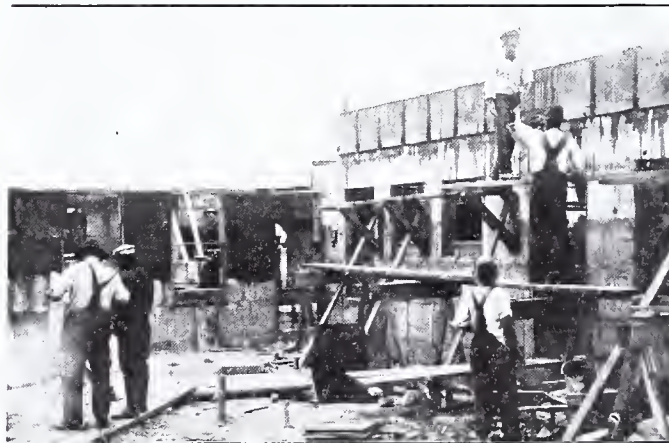
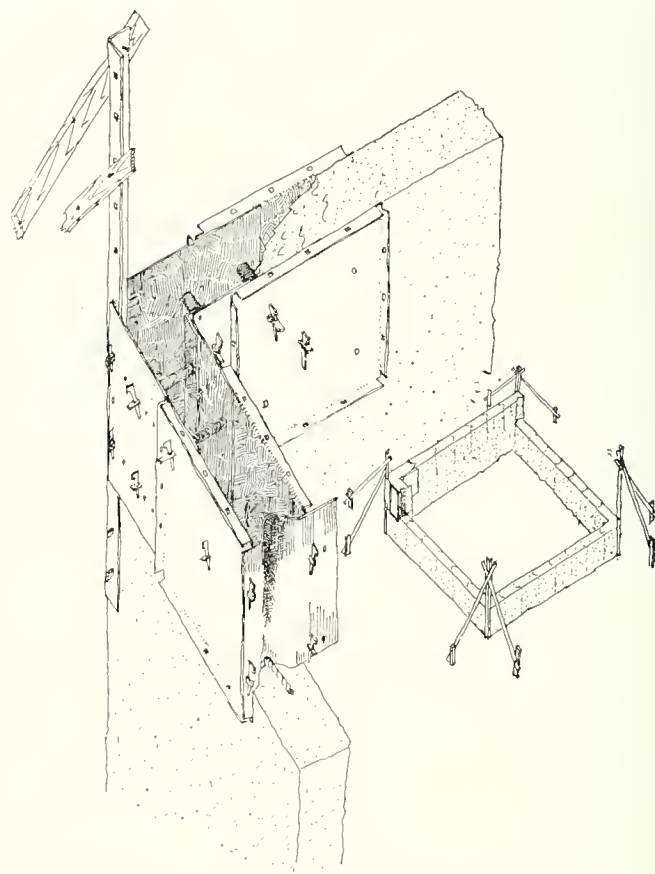
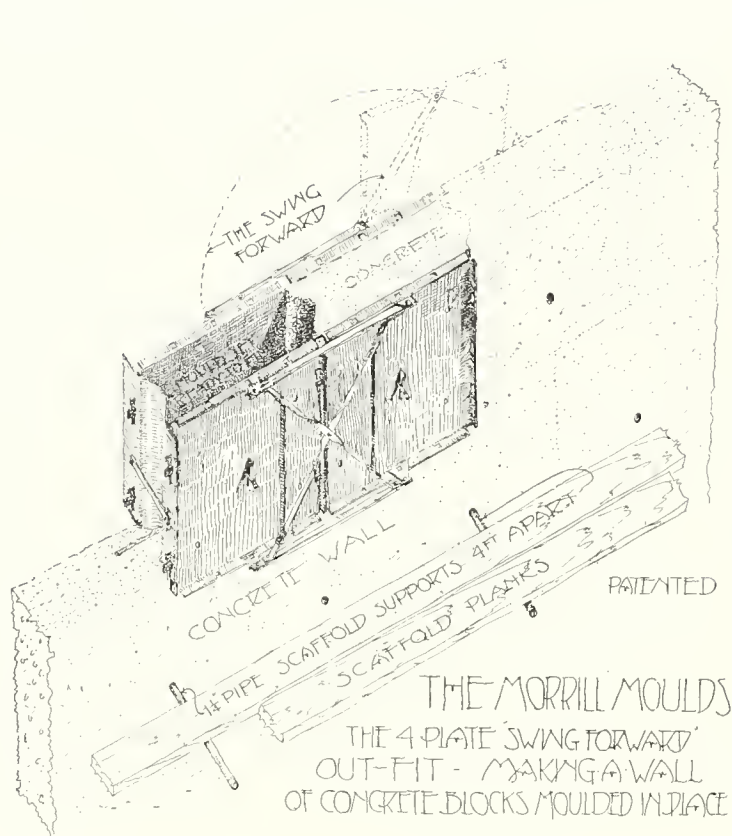


FIG. 54—Moulding the walls of the Overlook Colony houses for the General Chemical Company, using the one-tier move-forward outfit of the Morrill steel moulds.



FIGS. 55 and 56—The SWING-FORWARD outfit for moulding concrete walls.

Method of moulding corners used with the SWING-FORWARD outfit.



FIG. 57—The window and door frames and steel reinforcing rods can be set in between the form plates and easily located wherever desired. Nailing blocks are easily set in, as the wall rises only 2 feet at a time.

The two-mould "Swing-Forward" is the smallest of the Morrill Wall Moulding outfits. By this method the wall is moulded in place block by block. When the concrete is placed it must be stiff enough so that it will stand alone when the side plates are removed.

In starting a course the machine is clamped on the wall and filled. The back plates are then loosened; these hang free on the hinge arms. These plates are then swung around in front and locked, forming the sides of the next mould. This process is continued and the wall is moulded block by block. When one course is completed around the house the moulds are raised again to the top of the wall and another started. Corner angle rods are used to give the lines and levels, making it easy to keep the wall straight and plumb. Moulding machine can be carried on a wheel barrow. It is light and easily shipped, so is adaptable of use on the small house foundation or on the single house job at a distant point.

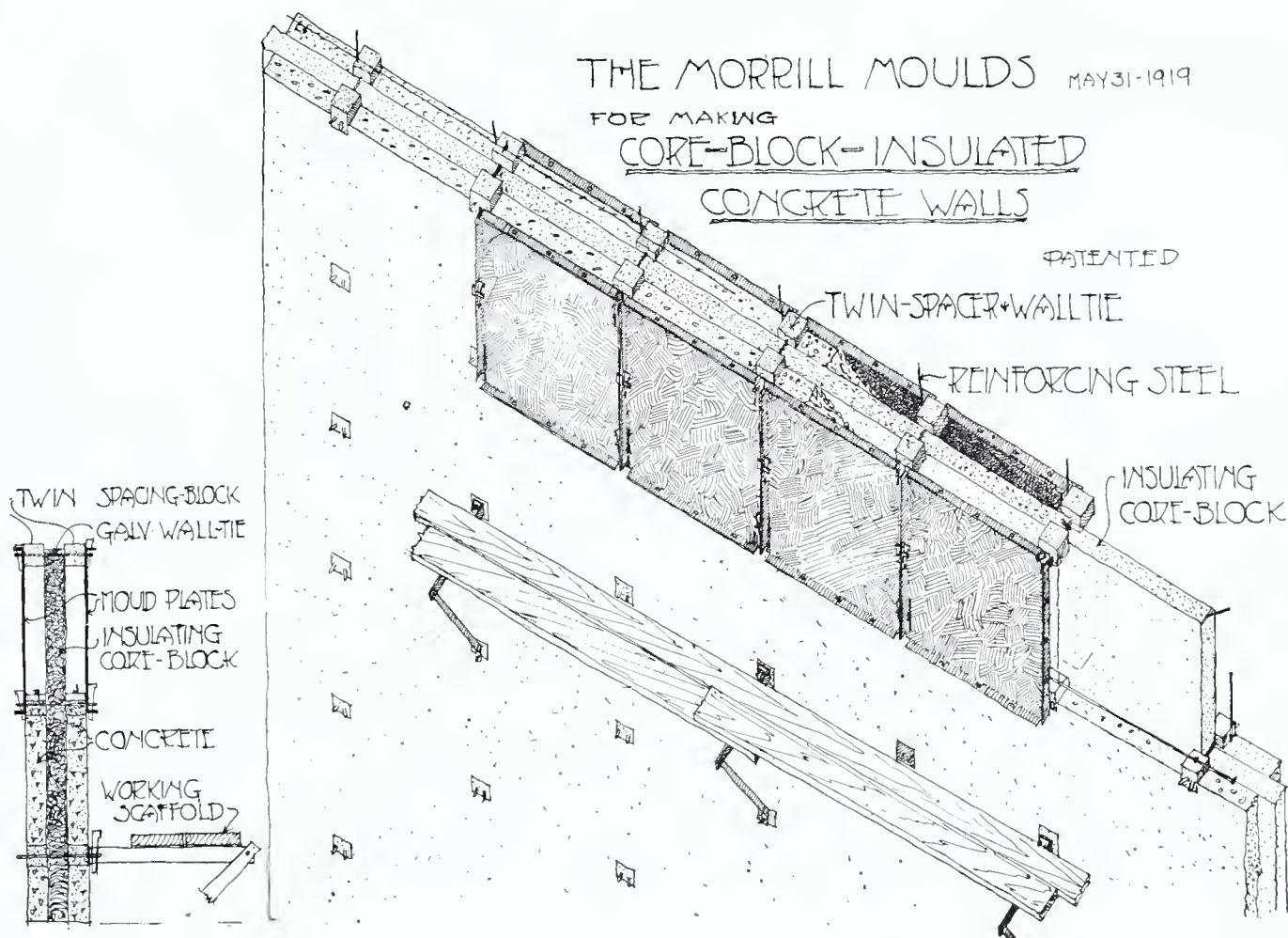


FIG. 58—Core-block insulated walls, like a blanket around the house, keep out the cold.

Insulated Walls

To insulate the house walls against the Winter cold, hollow gypsum partition blocks may be bedded in the middle of the concrete wall or insulated core blocks made before hand, may be moulded in the middle of the wall as shown above. These insulation blocks are inexpensive and easily made. These blocks are set in the middle of the wall and the concrete is moulded around them. The galvanized wall ties and spreader blocks are spaced 24 in. on centers. This makes a strong substantial wall and at the same time forms an ideal insulation against heat and cold. The spreader blocks are made with projecting hair-pins which serve as a tie to hold the forms in place and also form a substantial fastening for the scaffold brackets. The work is done from this light scaffold, which is moved up as the walls rise. When the walls are up and the cornice

work completed the scaffold is moved down stage by stage, the projecting wire hair-pins are clipped off and the over-coat of white cement stucco finish is applied.

Core block walls can be made by the Swing-up, the move-forward or the swing-forward outfits of the Morrill-Moulds.

GOVERNMENT WORK

The United States Government has adopted the Morrill Moulds for the construction of many large buildings, a few of which are shown on pages 13 and 22. While these moulds were primarily designed for the economic building of Morrill Moulded concrete houses, builders have seen the advantages of using them on all sorts of work, such as foundations, garages, barns, estate buildings, power houses, bridges, retaining walls, storage buildings and ware-houses.



Fig. 59. Powerhouse, U. S. Government, Arlington, Va.

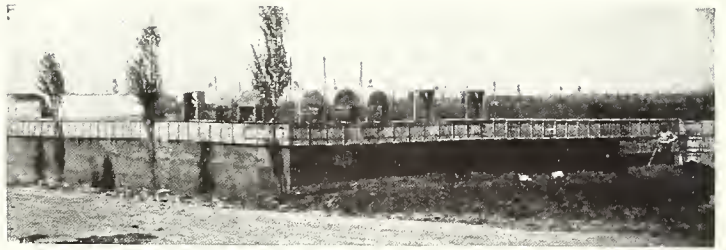


Fig. 65. Estate Buildings for J. B. Thomas, Esq., Middleburg, Va.



Fig. 63. U. S. Government Laboratory.



Fig. 66. Payson Residence, Tokeneke, Conn.



Fig. 60. Powerhouse, The Balsams Dixville Notch Corp., N. H.

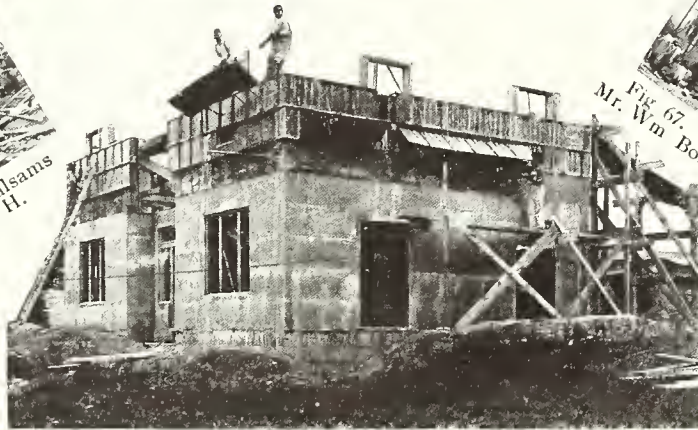


Fig. 64. Residence, George Washington Lewis Esq., Braddock, Va.



Fig. 67. Architect's Own House, Mr. Wm Boring, New Canaan, Conn.



Fig. 61. Residence, Raymond Holland, Esq., Tokeneke, Conn.

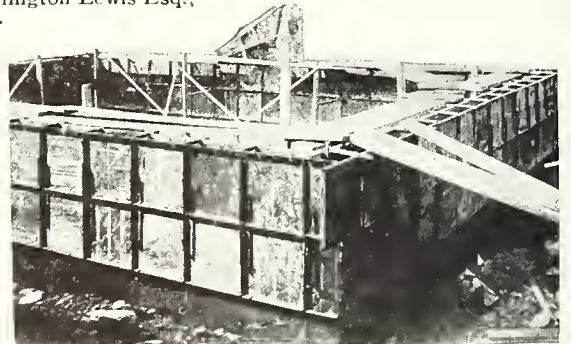


Fig. 68. Residence, Norwalk, Conn., W. G. Wood, Builder.

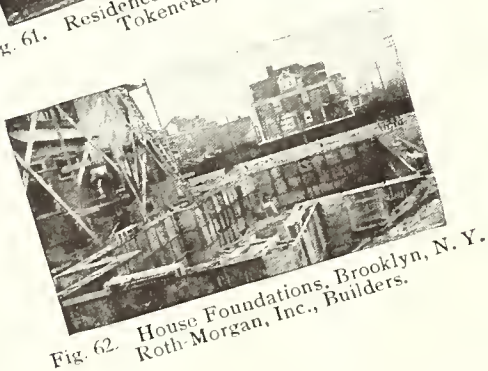


Fig. 62. House Foundations, Brooklyn, N. Y. Roth-Morgan, Inc., Builders.

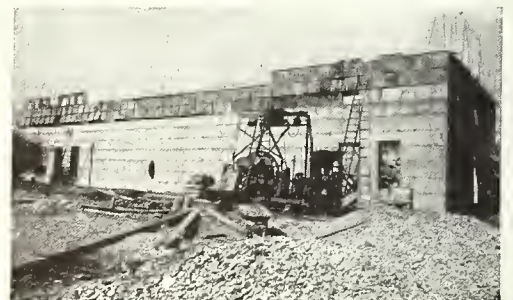


Fig. 69. U. S. Government Warehouse near Washington, D. C.

BUILDING WITH THE MORRILL STEEL FORMS

The Morrill Service

TO THE ARCHITECT

To the architect the Morrill service means cooperation in the successful building of concrete houses. As specialists in this work we can not only assist in the preparation of details of construction but we can furnish by rental or outright sale the proper equipment to do this work and assist in seeing that the work is properly done.

TO THE OWNER

To the owner the Morrill service means expert help in planning and laying out work, whether it be the buildings of an estate, a large residence, a small cottage or an industrial town. For this work we can furnish complete plans and specifications, furnish the necessary equipment and supervise the work. We prefer to let contracts to local men where they are equipped to do this work and to have local architects supervise, but if necessary we can handle the entire building operation from start to finish.

TO THE CONTRACTOR

We can furnish the steel form equipment to do this work either on a sale or rental basis. We can also send one or more workmen experienced in the use of the Morrill Moulds.

TO THE REAL ESTATE OWNER

Our standard houses will help him to dispose of his land. The novelty of this house moulding process centers public interest on the development where this work is started.

TO THE FARMER

We can furnish one of our smaller and inexpensive moulding outfits with which he can put up his own concrete foundations or buildings with the help of his farm labor.

TO THE CARPENTER OR MASON

We can furnish at small expense one of our wall moulding outfits. With this he can start, if he chooses, in a small way taking contracts

for foundations, etc., and so get into a profitable business for himself. Garage building also.

FOR INDUSTRIAL HOUSING

For industrial housing we can make a survey of the needs of your location. Make a report giving the best type of houses to build and estimates of cost. We can then work out plans and details, let sub-contracts, furnish equipment to do the work and supervise construction.

FOR THE INDIVIDUAL HOUSE

We can furnish plans, rent the steel moulds and supervise construction unless the distance makes this impossible. In which case we can give the builder full directions and instructions as to how to do the work.

EXPERT SERVICE AT REASONABLE COST

The aim of the Morrill service is to give you the most skillful and thorough assistance in your building operations and to keep the expense down to a minimum.

By skillful planning we have saved our clients thousands of dollars. House building is too expensive and important a matter to undertake with incomplete and unstudied plans. Be sure of your plans and then go ahead. A building well planned is half built.

REASONABLE COSTS

Where special plans are required and full architectural services are given the cost is based either on a fixed sum or on the exact time given to your work. In this way you pay for what you get. This is to your advantage rather than the usual percentage charge for plans, as in the latter case the more the work is made to cost the larger is the fee. Incentive to save you expense is here lacking.

For further information on these moulded concrete houses and the steel moulds to make them address

MILTON DANA MORRILL
Architect



FIG. 70—A concrete house of 6 rooms and bath, Virginia Highlands, near Washington.

The Morrill Moulded Concrete Houses

What they are. See pages 2 and 14.

They prove dry and warm. See letters from owners. page 3.

How they are built. You will be interested in this new method of moulding houses in steel moulds. Page 16.

Houses made of ashes. War-time housing for the General Chemical Co. Waste products turned into fireproof houses. Page 10.

The Gold Medal house. How the work started. Pages 2 and 12.

Industrial houses of moulded concrete. The Concrete City at Nanticoke, Pa. Page 8. Houses that can be washed out with a hose.

Standard houses. Manufacturing methods applied to house building. Variety of appearance possible. Page 6.

Attractive stucco walls add beauty to the concrete house. Page 15.

Air-Light (L) Shaped houses save cost in land and space. Moulded houses for city building. Page 11.

Moulding houses by the "one-day" process. Page 16. The U. S. Government adopts the Swing-up moulding method of building. Page 16.

Inexpensive house moulding outfits. Pages 19 and 20.

Houses that are fireproof, sanitary and everlasting.

MILTON DANA MORRILL
Architect

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New York, N. Y.
Telephone Farragut 59

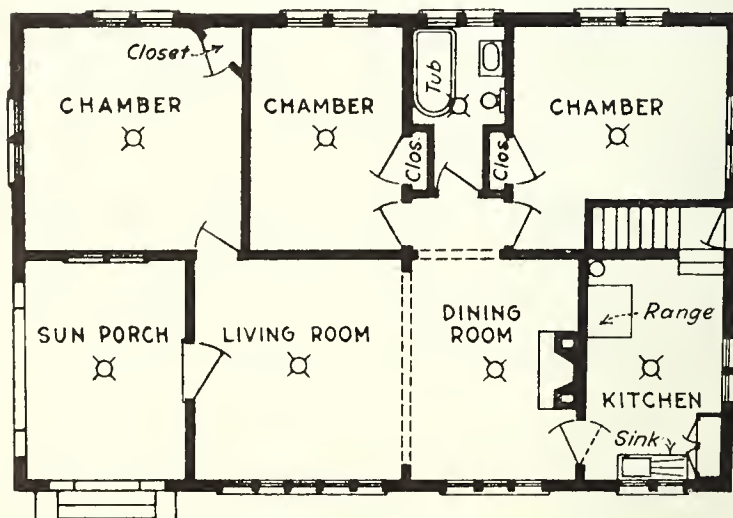


FIG. 71—Plan of house illustrated above.